

Introduction - Grade 8 Science

The following released test questions are taken from the Grade 8 Science Standards Test. This test is one of the California Standards Tests administered as part of the Standardized Testing and Reporting (STAR) Program under policies set by the State Board of Education.

All questions on the California Standards Tests are evaluated by committees of content experts, including teachers and administrators, to ensure their appropriateness for measuring the California academic content standards in Grade 8 Science. In addition to content, all items are reviewed and approved to ensure their adherence to the principles of fairness and to ensure no bias exists with respect to characteristics such as gender, ethnicity, and language.

This document contains released test questions from the California Standards Test form in 2006. First on the pages that follow are lists of the Grade 8 standards assessed on the Grade 8 Science Test. Next are released test questions. Following the questions is a table that gives the correct answer for each question, the content standard that each question is measuring, and the year each question appeared on the test. Reference sheets, provided for students taking the test, are also included as they are necessary in answering some of the questions.

The following table lists each reporting cluster, the number of items that appear on the exam, and the number of released test questions that appear in this document.



REPORTING CLUSTER	NUMBER OF QUESTIONS ON EXAM	NUMBER OF RELEASED TEST QUESTIONS
Investigation and Experimentation (Standards: 8PCIE9. a-g)	6	1
Motion (Standards: 8PC1. a-f)	8	2
Forces, Density and Buoyancy (Standards: 8PC2. a-g, 8PC8. a-d)	13	3
Structure of Matter and Periodic Table (Standards: 8PC3. a-f, 8PC7. a-c)	16	3
Earth in the Solar System (Standards: 8PC4. a-e)	7	2
Reactions and the Chemistry of Living Systems (Standards: 8PC5. a-e, 8PC6 a-c)	10	4
TOTAL	60	15

In selecting test questions for release, three criteria are used: (1) the questions adequately cover a selection of the academic content standards assessed on the Grade 8 Science Test; (2) the questions demonstrate a range of difficulty; and (3) the questions represent a variety of ways standards can be assessed. These released test questions do not reflect all of the ways the standards may be assessed. Released test questions will not appear on future tests.

For more information about the California Standards Tests, visit the California Department of Education's Web site at <http://www.cde.ca.gov/ta/tg/sr/resources.asp>.

THE INVESTIGATION AND EXPERIMENTATION REPORTING CLUSTER

The following seven California content standards are included in the Grade 8 Investigation and Experimentation reporting cluster and are represented in this booklet by one test question. This question represents only one way in which these standards may be assessed on the California Grade 8 Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Investigation and Experimentation

- | | |
|------------------|--|
| 8PCIE9. | Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will: |
| 8PCIE9.a. | Plan and conduct a scientific investigation to test a hypothesis. |
| 8PCIE9.b. | Evaluate the accuracy and reproducibility of data. |
| 8PCIE9.c. | Distinguish between variable and controlled parameters in a test. |
| 8PCIE9.d. | Recognize the slope of the linear graph as the constant in the relationship $y = kx$ and apply this principle in interpreting graphs constructed from data. |
| 8PCIE9.e. | Construct appropriate graphs from data and develop quantitative statements about the relationships between variables. |
| 8PCIE9.f. | Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height). |
| 8PCIE9.g. | Distinguish between linear and nonlinear relationships on a graph of data. |

THE MOTION REPORTING CLUSTER

The following six California content standards are included in the Grade 8 Motion reporting cluster and are represented in this booklet by two test questions. These questions represent only some ways in which these standards may be assessed on the California Grade 8 Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Motion

8PC1.	The velocity of an object is the rate of change of its position. As a basis for understanding this concept:
8PC1.a.	<i>Students know</i> position is defined in relation to some choice of a standard reference point and a set of reference directions.
8PC1.b.	<i>Students know</i> that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary.
8PC1.c.	<i>Students know</i> how to solve problems involving distance, time, and average speed.
8PC1.d.	<i>Students know</i> the velocity of an object must be described by specifying both the direction and the speed of the object.
8PC1.e.	<i>Students know</i> changes in velocity may be due to changes in speed, direction, or both.
8PC1.f.	<i>Students know</i> how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.

THE FORCES, DENSITY AND BUOYANCY REPORTING CLUSTER

The following 11 California content standards are included in the Grade 8 Forces, Density and Buoyancy reporting cluster and are represented in this booklet by three test questions. These questions represent only some ways in which these standards may be assessed on the California Grade 8 Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Forces

8PC2.	Unbalanced forces cause changes in velocity. As a basis for understanding this concept:
8PC2.a.	<i>Students know</i> a force has both direction and magnitude.
8PC2.b.	<i>Students know</i> when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.
8PC2.c.	<i>Students know</i> when the forces on an object are balanced, the motion of the object does not change.
8PC2.d.	<i>Students know</i> how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.
8PC2.e.	<i>Students know</i> that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction).
8PC2.f.	<i>Students know</i> the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.
8PC2.g.	<i>Students know</i> the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system.

Density and Buoyancy

8PC8.	All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept:
8PC8.a.	<i>Students know</i> density is mass per unit volume.
8PC8.b.	<i>Students know</i> how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
8PC8.c.	<i>Students know</i> the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
8PC8.d.	<i>Students know</i> how to predict whether an object will float or sink.

THE STRUCTURE OF MATTER AND PERIODIC TABLE REPORTING CLUSTER

The following nine California content standards are included in the Grade 8 Structure of Matter and Periodic Table reporting cluster and are represented in this booklet by three test questions. These questions represent only some ways in which these standards may be assessed on the California Grade 8 Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Structure of Matter

8PC3. Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:

8PC3.a. *Students know* the structure of the atom and know it is composed of protons, neutrons, and electrons.

8PC3.b. *Students know* that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.

8PC3.c. *Students know* atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers.

8PC3.d. *Students know* the states of matter (solid, liquid, gas) depend on molecular motion.

8PC3.e. *Students know* that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently.

8PC3.f. *Students know* how to use the periodic table to identify elements in simple compounds.

Periodic Table

8PC7. The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept:

8PC7.a. *Students know* how to identify regions corresponding to metals, nonmetals, and inert gases.

8PC7.b. *Students know* each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus.

8PC7.c. *Students know* substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.

THE EARTH IN THE SOLAR SYSTEM SCIENCE REPORTING CLUSTER

The following five California content standards are included in the Grade 8 Earth in the Solar System reporting cluster and are represented in this booklet by two test questions. These questions represent only some ways in which these standards may be assessed on the California Grade 8 Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER**Earth in the Solar System**

8PC4.	The structure and composition of the universe can be learned from studying stars and galaxies and their evolution. As a basis for understanding this concept:
8PC4.a.	<i>Students know</i> galaxies are clusters of billions of stars and may have different shapes.
8PC4.b.	<i>Students know</i> that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.
8PC4.c.	<i>Students know</i> how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.
8PC4.d.	<i>Students know</i> that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.
8PC4.e.	<i>Students know</i> the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

THE REACTIONS AND THE CHEMISTRY OF LIVING SYSTEMS REPORTING CLUSTER

The following eight California content standards are included in the Grade 8 Reactions and the Chemistry of Living Systems reporting cluster and are represented in this booklet by four test questions. These questions represent only some ways in which these standards may be assessed on the California Grade 8 Science Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Reactions

- | | |
|----------------|---|
| 8PC5. | Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept: |
| 8PC5.a. | <i>Students know</i> reactant atoms and molecules interact to form products with different chemical properties. |
| 8PC5.b. | <i>Students know</i> the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same. |
| 8PC5.c. | <i>Students know</i> chemical reactions usually liberate heat or absorb heat. |
| 8PC5.d. | <i>Students know</i> physical processes include freezing and boiling, in which a material changes form with no chemical reaction. |
| 8PC5.e. | <i>Students know</i> how to determine whether a solution is acidic, basic, or neutral. |

Chemistry of Living Systems

- | | |
|----------------|---|
| 8PC6. | Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept: |
| 8PC6.a. | <i>Students know</i> that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms. |
| 8PC6.b. | <i>Students know</i> that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. |
| 8PC6.c. | <i>Students know</i> that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA. |

Released Test Questions

Science

8

- 1** A spring scale is pulled downward and readings are recorded.

Data Table

Distance Pulled	Spring Scale Reading
1.0 cm	4 N
1.5 cm	6 N
2.0 cm	8 N
2.5 cm	10 N

If the spring is pulled 3.5 cm, the spring scale should read

- A 12 N.
- B 13 N.
- C 14 N.
- D 15 N.

CSZ20855

- 2** An athlete can run 9 kilometers in 1 hour. If the athlete runs at that same average speed for 30 minutes, how far will the athlete travel?

- A 18 kilometers
- B 9 kilometers
- C 4.5 kilometers
- D 3.3 kilometers

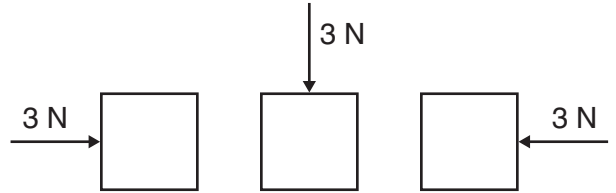
CSZ30338

- 3** Which characteristic of motion could change without changing the velocity of an object?

- A the speed
- B the position
- C the direction
- D the acceleration

CSZ20754

- 4** A force is acting on each of the objects below.



What can be concluded about these forces?

- A They are the same because they point toward the objects.
- B They are the same because they have the same magnitude.
- C They are different because they have different magnitudes.
- D They are different because they have different directions.

CSZ30259

- 5** A force of 5 N is required to increase the speed of a box from a rate of $1.0 \frac{\text{m}}{\text{s}}$ to $3.0 \frac{\text{m}}{\text{s}}$ within 5 s along a level surface. What change would *most likely* require additional force to produce the same results?

- A reduce the mass of the box
- B increase the mass of the box
- C make the surfaces of the box smooth
- D make the surface of the floor smooth

CSZ30764

6 A piece of pine wood floats on the surface of a lake because the water exerts

- A an upward force equal to the weight of the wood.
- B a downward force equal to the weight of the wood.
- C an upward force equal to the weight of the displacement water.
- D a downward force equal to the weight of the displacement water.

CSZ40404

7 Which of the following *best* describes an atom?

- A protons and electrons grouped together in a random pattern
- B protons and electrons grouped together in an alternating pattern
- C a core of protons and neutrons surrounded by electrons
- D a core of electrons and neutrons surrounded by protons

CSZ30661

8 Which of the following is found farthest from the center of an atom?

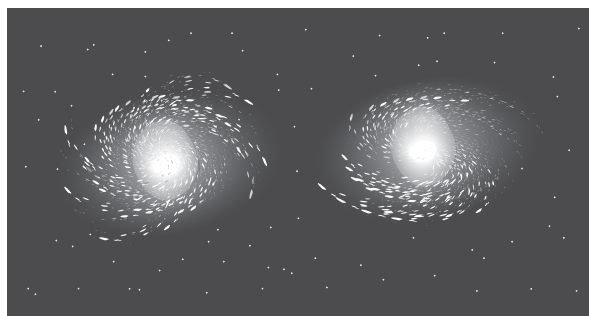
- A nucleus
- B proton
- C neutron
- D electron

CSZ30564

9 In a comparison of metals to nonmetals, metals tend to have

- A lower melting points and greater conductivity than nonmetals.
- B lower conductivity and lower density than nonmetals.
- C higher density and lower melting points than nonmetals.
- D greater conductivity and higher melting points than nonmetals.

CSZ30771

10

The galaxies pictured above would *best* be classified as

- A barred galaxies.
- B spiral galaxies.
- C irregular galaxies.
- D symmetrical galaxies.

CSZ40051

11 To express the distance between the Milky Way galaxy and other galaxies, the *most* appropriate unit of measurement is the

- A meter.
- B kilometer.
- C light-year.
- D astronomical unit.

CSZ20679

Released Test Questions

Science

8

- 12** The following equations represent chemical reactions.

Chemical Reactions

1	$2\text{Na} + 2\text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
2	$\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
3	$\text{Mg} + \text{Cl}_2 \rightarrow \text{MgCl}_2$
4	$\text{NaOH} + \text{MgCl}_2 \rightarrow \text{NaCl} + \text{MgOH}$

Which equation shows that the total mass during a chemical reaction stays the same?

- A 1
B 2
C 3
D 4

CSZ30150

- 13** Which of the following forms of energy is released or absorbed in *most* chemical reactions?

- A light energy
B electrical energy
C sound energy
D heat energy

CSZ30457

- 14** The table below shows the pH and reaction to litmus of four body fluids.

Body Fluid	pH	red litmus	blue litmus
Blood	7.4	turns blue	no change
Bile	8.2	turns blue	no change
Saliva	6.8	no change	turns red
Gastric Juice	1.7	no change	turns red

These data indicate that gastric juice is

- A very acidic.
B very basic.
C positively charged.
D negatively charged.

CSZ20786

- 15** What characteristic of carbon (C) makes it essential to living organisms?

- A Carbon forms crystal structures under certain conditions.
B Carbon can exist as a solid, liquid, or gas.
C Carbon bonds in many ways with itself to form chains.
D Carbon exists in radioactive forms.

CSZ30696

Question Number	Correct Answer	Standard	Year of Test
1	<i>C</i>	8PCIE9.E	2006
2	<i>C</i>	8PC1.C	2006
3	<i>B</i>	8PC1.E	2006
4	<i>D</i>	8PC2.A	2006
5	<i>B</i>	8PC2.F	2006
6	<i>C</i>	8PC8.C	2006
7	<i>C</i>	8PC3.A	2006
8	<i>D</i>	8PC3.A	2006
9	<i>D</i>	8PC7.C	2006
10	<i>B</i>	8PC4.A	2006
11	<i>C</i>	8PC4.C	2006
12	<i>C</i>	8PC5.B	2006
13	<i>D</i>	8PC5.C	2006
14	<i>A</i>	8PC5.E	2006
15	<i>C</i>	8PC6.A	2006

18																	
8A																	
2																	
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4.00																	
7A																	
17																	
F																	
Fluorine																	
19.00																	
6A																	
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N																	
Nitrogen																	
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Carbon																	
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Boron																	
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Al																	
Aluminum																	
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2B																	
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Zn																	
Zinc																	
65.39																	
31																	
Ga																	
Gallium																	
69.72																	
32																	
Ge																	
Germanium																	
72.61																	
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As																	
Arsenic																	
74.92																	
51																	
Sb																	
Antimony																	
121.76																	
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Te																	
Tellurium																	
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Iodine																	
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Polonium																	
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208.98																	
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Lead																	
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Gold																	
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24.31																	
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Potassium																	
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Br																	
Bromine																	
79.90																	
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Kr																	
Krypton																	
83.80																	
37																	
Rb																	
Rubidium																	
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Sr																	
Strontium																	
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Yttrium																	
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Nb																	
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Mo																	
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Rh																	
Rhodium																	
102.91																	
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Pd																	
Palladium																	
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Ag																	
Silver																	
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48																	
Cd																	
Cadmium																	
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Indium																	
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Gadolinium																	
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Dysprosium																	
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Ho																	
Holmium																	
164.93																	
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Er																	
Erbium																	
167.26																	
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Tm																	
Thulium																	
168.93																	
70																	
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Lu																	
Lutetium																	
174.97																	
102																	
No																	
Nobelium																	
(259)																	
103																	
Lr																	
Lawrencium																	
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Md																	
Mendelevium																	
(258)																	
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Fm																	
Fermium																	
(257)																	
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Vanadium																	
50.94																	
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Cr																	
Chromium																	
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Mn																	
Manganese																	
54.94																	
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Fe																	
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69.72																	
32																	
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72.61																	
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83.80																	
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Rb																	
Rubidium																	
85.47																	
38																	
Sr																	
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87.62																	
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Y																	
Yttrium																	
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Zr																	
Zirconium																	
91.22																	
41																	
Nb																	
Niobium																	
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Mo																	
Molybdenum																	
95.94																	
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Ru																	
Ruthenium																	
101.07																	
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Rh																	
Rhodium																	
102.91																	
46																	
Pd																	
Palladium																	
106.42																	
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Ag																	
Silver																	
107.87																	
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Cadmium																	
112.41																	
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Indium																	
114.82																	
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Tin																	
118.71																	
51																	
Sb																	
Antimony																	
121.76																	
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Tellurium																	
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131.29																	
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138.91																	
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Ba																	
Barium																	
137.33																	
57																	
Cs																	
Cesium																	
132.91																	
58																	
Ce																	
Cerium																	
140.12																	
59																	
Pr																	
Praseodymium																	
140.91																	
60																	
Nd																	
Neodymium																	
144.24																	
61																	
Pm																	
Promethium																	
(145)																	
62																	
Sm																	
Samarium																	
150.36																	
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151.96																	
64																	
Gd																	
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174.97																	
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92																	
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Uranium																	
238.03																	
91																	
Pa																	
Protactinium																	
231.04																	
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Thorium																	
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K																	

Key

11	Atomic number
Na	Element symbol
Sodium	Element name
22.99	Average atomic mass *

* If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.

Formulas and Conversions

Density: $D = \frac{m}{V}$

Length: 1 m = 100 cm
1 km = 1000 m

Volume: 1 L = 1000 mL = 1000 cm³

Average Speed: $v = \frac{d}{t}$

Mass: 1 kg = 1000 g

Water at Room Temperature: 1 mL = 1 cm³ = 1 g